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22462 7590 05/05/2009 GATES & COOPER LLP HOWARD HUGHES CENTER 6701 CENTER DRIVE WEST, SUITE 1050 LOS ANGELES, CA 90045				
EXAMINER				
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HUGUES MARCHAND and
BRENDAN JUDE MORAN

Appeal 2009-2232
Application 09/922,122
Technology Center 1700

Decided:¹ May 5, 2009

Before EDWARD C. KIMLIN, TERRY J. OWENS, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 2, 4-9, 11-17, 35, and 38. Claims 18-34, which are all of the other pending claims, stand withdrawn from consideration by the Examiner. We have jurisdiction under 35 U.S.C. § 6(b).

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

The Invention

The Appellants claim a semiconductor film comprising a single crystal graded gallium nitride layer that is on a silicon substrate and has a net compressive stress. Claim 1 is illustrative:

1. A semiconductor film, comprising:

a silicon substrate; and

a single crystal graded gallium nitride layer deposited on the silicon substrate having a varying composition of a substantially continuous grade from an initial composition to a final composition and a net compressive stress.

The References

Redwing	5,874,747	Feb. 23, 1999
Tischler	6,765,240 B2	Jul. 20, 2004

(effective filing data on or before Oct. 21, 1997)

The Rejections

The claims stand rejected as follows: claims 1, 2, 4-9, 15-17, 35, and 38 under 35 U.S.C. § 102(e) over Tischler, and claims 11-14 under 35 U.S.C. § 103 over Tischler in view of Redwing.

OPINION

We reverse the Examiner's rejections.

We need to address only the rejection of claim 1, which is the sole independent claim. The Examiner does not rely upon Redwing for any disclosure that would have rendered *prima facie* obvious, to one of ordinary skill in the art, any subject matter in the Appellants' claim 1 not disclosed by Tischler (Ans. 5-6).

Issue

Have the Appellants shown reversible error in the Examiner's determination that Tischler discloses, expressly or inherently, a graded gallium nitride layer having a net compressive stress?

Findings of Fact

Tischler discloses "bulk single crystal binary, ternary or quaternary metal nitrides such as gallium nitride" (col. 1, ll. 10-11). The ternary or quaternary metal nitrides can be of graded composition such as AlGa_{0.5}N or AlGaInN (col. 7, ll. 13-16; col. 12, ll. 37-38). Tischler points out that defects in the form of dislocations generated during cool-down after growth of the nitride layer can result due to different thermal coefficients of expansion of the nitride layer and the substrate on which it is grown (col. 4, ll. 61-63). Tischler eliminates such defects by in-situ removal of the substrate (which can be silicon (col. 2, ll. 47-48)) by, for example, etching, at or near the growth temperature, i.e., within 300°C, most preferably within 25°C, of the 800-1300°C growth temperature (col. 5, ll. 5-10, 34-40, 58-62; col. 6, ll. 45-48, 59-60). The remaining free-standing metal nitride then is cooled (col. 6, ll. 63-64).

Analysis

"Anticipation requires that every limitation of the claim in issue be disclosed, either expressly or under principles of inherency, in a single prior art reference." *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1255-56 (Fed. Cir. 1989).

The Appellants argue that there is no evidence that Tischler's free-standing layer, while still on the substrate and cooled to only 300°C or less below the 800-1300°C growth temperature, has a net compressive stress

(Reply Br. 5-7). The Appellants argue that when Tischler's free-standing nitride layer is cooled it is not subject to thermal mismatch and, therefore, should be stress free (Br. 6; Reply Br. 6).

The Examiner argues that the Appellants' disclosure that "a larger amount of compressive strain is present in the layer structure than is found when using other methods" (Spec. 8:2-3) is an admission that other methods produce compressive strain (Ans. 3).

The compressive strain referred to by the Appellants is that induced by a cool-down procedure (Spec. 8:2-5). That disclosure by the Appellants is not an admission that Tischler's layer structure within 300°C of the 800-1300°C growth temperature has compressive strain.

The Examiner argues that "Tischler et al disclose that a single crystal has no defects from thermal coefficient of expansion differences, i.e.[.] cracks (col 12, ln 45-65 and col 13, ln 1-5), which is further evidence that there is a net compressive stress because appellant discloses that crack free graded GaN has a net compressive stress, note page 8, lines 1-10 of the specification" (Ans. 3).

Tischler's disclosure that the single crystal nitride has no defects from thermal coefficient of expansion differences pertains to the single crystal nitride after being removed from the substrate at a temperature within 300°C of the 800-1300°C growth temperature and then cooled (col. 6, ll. 45-47, 63-64). The Examiner has not established that this disclosure is relevant to whether the single crystal nitride is under net compressive stress while still on the substrate at a temperature within 300°C of the growth temperature, which is the structure the Examiner relies upon as corresponding to the Appellants' graded gallium nitride layer on a substrate (Ans. 6).

The Examiner argues that Tischler's cooling to within 300°C of the growth temperature causes compressive stress but does not cause tensile stress (Ans. 7).

That argument is not persuasive because it is not supported by evidence.

The Examiner argues that before Tischler's substrate is removed there is some stress due to the difference in coefficients of thermal expansion between the nitride layer and the substrate (Ans. 7-8).

Even if that argument is correct, the Examiner has not established that the stress is a net compressive stress.

Conclusion of Law

The Appellants have shown reversible error in the Examiner's determination that Tischler discloses, expressly or inherently, a graded nitride layer having a net compressive stress.

DECISION/ORDER

The rejections of claims 1, 2, 4-9, 15-17, 35, and 38 under 35 U.S.C. § 102(e) over Tischler, and claims 11-14 under 35 U.S.C. § 103 over Tischler in view of Redwing are reversed.

It is ordered that the Examiner's decision is reversed.

REVERSED

PL Initial
sld

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Application 09/922,122

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